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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/814,338	03/21/2001	Jonathan M. Rothberg	21465-501 CIP2	6233

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EXAMINER

KIM, YOUNG J

ART UNIT	PAPER NUMBER
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1637

DATE MAILED: 07/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/814,338	Applicant(s) ROTHBERG ET AL.	
	Examiner Young J. Kim	Art Unit 1637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 56-61, 64-68, 84-93 and 96-100 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 56-61, 64-68, 84-93 and 96-100 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4/23/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action responds the Amendment received on April 23, 2004.

Preliminary Remark

The Office acknowledges the cancellation of claims 1-55, drawn to non-elected invention and the addition of new claim 100.

Information Disclosure Statement

The IDS received on April 23, 2004 is acknowledged. A signed copy of its corresponding PTO-1449 is attached hereto.

Priority

Applicants' remark regarding the effective filing date of the instant application is persuasive. Therefore, the effective filing date of the instant application is determined to be September 18, 2000, provided by the parent U.S. application, 09/664,197. The filing date of the parent application, serial number 09/398,833, having the filing date of September 16, 1999, *does not* provide a proper written support under 35 U.S.C. 112, first paragraph for the limitation drawn to a wafer having the thickness between "0.5 mm and 5.00 mm."

Specification

The objection to the specification for containing an active hyperlink, made in the Office Action mailed on November 6, 2003 is withdrawn in view of the Amendment received on April 23, 2004.

Claim Rejections - 35 USC § 112

The new matter rejection of claims 56-61, 64-68, 84-93, and 96-99 under 35 U.S.C. 112, first paragraph as failing to comply with the written description requirement, made in the Office

Art Unit: 1637

Action mailed on November 6, 2003 is withdrawn in view of the Amendment received on April 23, 2004.

The rejection of claims 84-87 and 96-99 under 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter, made in the Office Action mailed on November 6, 2003 is withdrawn in view of the Amendment received on April 23, 2004.

Claim Rejections - 35 USC § 103

The rejection of claims 56-61, 64-68, 84-93, and 96-99 under 35 U.S.C. 103(a) as being unpatentable over Chee et al. (2003/0108867 A1, issued June 12, 2003, priority April 20, 1999), made in the Office Action mailed on November 6, 2003 is withdrawn in view of the Declaration of Marcel Margulies and the arguments made in the Amendment received on April 23, 2004.

Rejection – New Ground

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 56-61, 64-68, 84-93, and 96-100 rejected under 35 U.S.C. 103(a) as being unpatentable over Chee et al. (2003/0108867 A1, published June 12, 2003, priority April 20, 1999) in view of Kain et al. (US 2002/0039728 A1, published April 4, 2002, priority February 10, 2000).

Chee et al. disclose a substrate (and apparatus comprising the substrate) for pyrosequencing a nucleic acid template, wherein the substrate is comprised of a bundle of plurality of fused, optical fibers which are “etched” such that small wells or depressions are formed at the end of the fibers (or cavitated) (Figure 1A-D, [0109], and [0112]). The cavitated optical fibers also comprise microspheres immobilized with capture probes ([0052]; claim limitation 57 and 100) and immobilized pyrosequencing reagents ([0057]).

Chee et al. disclose that the nucleic acids or DNAs ([0093]; claim limitation 87) are immobilized to the microspheres by linkers or covalently ([0015] and [0087]; claim limitation 67 and 68).

The substrate of Chee et al. is disclosed being able to have a wide range of nucleic acids, ranging from 10^2 to 10^9 ([0104]; claim limitation 64-66) as well as being chemically functionalized for photolithography ([0111]-[0114]; claim limitation 90, 91, 96, and 97).

The immobilized pyrosequencing reagents (on the microspheres, [0057]) are disclosed as being luciferase, sulfurylase, or apyrase ([0040]; claim limitation 92, 93, 98, and 99).

Although Chee et al. do not explicitly disclose that the imaging of the sequencing reaction is done through CCD (charge coupled device), such is implicit by the disclosure of the specification, wherein the artisans image the incorporated nucleotide in their fiber optic substrate ([0192]; claim limitation 86).

Chee et al. do not *explicitly disclose* the diameter of the individual optical fiber (claim limitation 58 and 85) nor the cavitated fiber optic wafer having a depth between 0.5 mm and 5.0 mm.

Chee et al. do not *explicitly disclose* various separation distance between the nucleic acids that are immobilized on the substrate or microspheres (claims 59-61).

Chee et al. do not explicitly disclose that a polished end of a fiber optic wafer is optically linked to a second fiber optic fiber (claims 88 and 89).

Kain et al. disclose an array formed from a bundle of optical fibers, wherein one of the ends of the optical fibers are cavitated [0038], and wherein Kain et al. disclose that the fiber optic bundle can be, “any length.” (or depth) [0073].

Kain et al. discuss that the reaction sites of the array can be separated based on the desired density of the arrays, wherein high density arrays are characterized as having sites separated by less than about 5 μm - 15 μm ; medium density arrays as having sites separated by about 15 μm -30 μm , etc [0061].

Kain et al. also disclose that the cut ends of the optical fibers are polished [0080].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Chee et al. with the teachings of Kain et al. to arrive at the invention as claimed.

One of ordinary skill in the art, at the time the invention was made, would have been motivated to modify the teachings for the following reasons.

As evidenced by the teachings of Kain et al., the modification of the separation distances between the nucleic acids as well as the modification of the diameters of the fiber optic strands, are well within the purview of an artisan’s desire on what density said artisan desires to achieve, allowing the artisan to have a reasonable expectation of success arriving at the invention as claimed.

Additionally, although the claims recite that the substrate now comprises a cavitated fiber optic *wafer*, the wafer is defined by the claim as a bundle of fiber optic strands having a front end and a distal end with the length of the bundle being 0.5 to 5.0 mm (Applicants' term this "depth"). This limitation is obvious in view of the teachings provided by Kain et al., wherein the artisans teach a method of making an array of fused optical fibers [0072 – 0083], wherein the artisans state that any length (or depth) could be generated. Additionally, the artisans disclose that the planar substrate formed by the fused optical fibers can be inserted into a second substrate (Figure 1D; [0086]).

Based on such disclosure, one of ordinary skill in the art would have been able to generate the fiber optic array of appropriate length so as to be able to insert into a second substrate with a reasonable expectation of success.

Additionally, the length of the fiber optic bundle does not materially affect the ability of the substrate in transmitting the signals produced from a ligand binding assays. This is evident in Applicants' claim 89, which requires that the ends of the shortened fiber optic bundles (of the wafer) be attached to second optical fiber bundles to be able to transmit the data across to the imaging device. The net effect, therefore, requires a long bundle of fiber optic fibers attached to an imaging device, resulting in the fiber optic array disclosed by Chee et al. At best, the shortened length of the fiber optic bundle allows portability of the claimed substrates, which has been already disclosed by Kain et al.

Therefore, the invention as claimed is obvious over the cited reference.

Conclusion

Art Unit: 1637

No claims are allowed

Inquiries

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Young J. Kim whose telephone number is (571) 272-0785. The Examiner can normally be reached from 8:30 a.m. to 6:00 p.m. Monday through Thursday. If attempts to reach the Examiner by telephone are unsuccessful, the Primary Examiner in charge of the prosecution, Dr. Kenneth Horlick, can be reached at (571) 272-0784. If the attempts to reach the above Examiners are unsuccessful, the Examiner's supervisor, Gary Benzion, can be reached at (571) 272-0782. Papers related to this application may be submitted to Art Unit 1637 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1156 OG 61 (November 16, 1993) and 1157 OG 94 (December 28, 1993) (see 37 CFR 1.6(d)). NOTE: If applicant does submit a paper by FAX, the original copy should be retained by applicant or applicant's representative. NO DUPLICATE COPIES SHOULD BE SUBMITTED, so as to avoid the processing of duplicate papers in the Office. All official documents must be sent to the Official Tech Center Fax number: (703) 872-9306. For Unofficial documents, faxes can be sent directly to the Examiner at (517) 273-0785. Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (571) 272-0507.



Young J. Kim
Patent Examiner
Art Unit 1637
7/14/04

yjk